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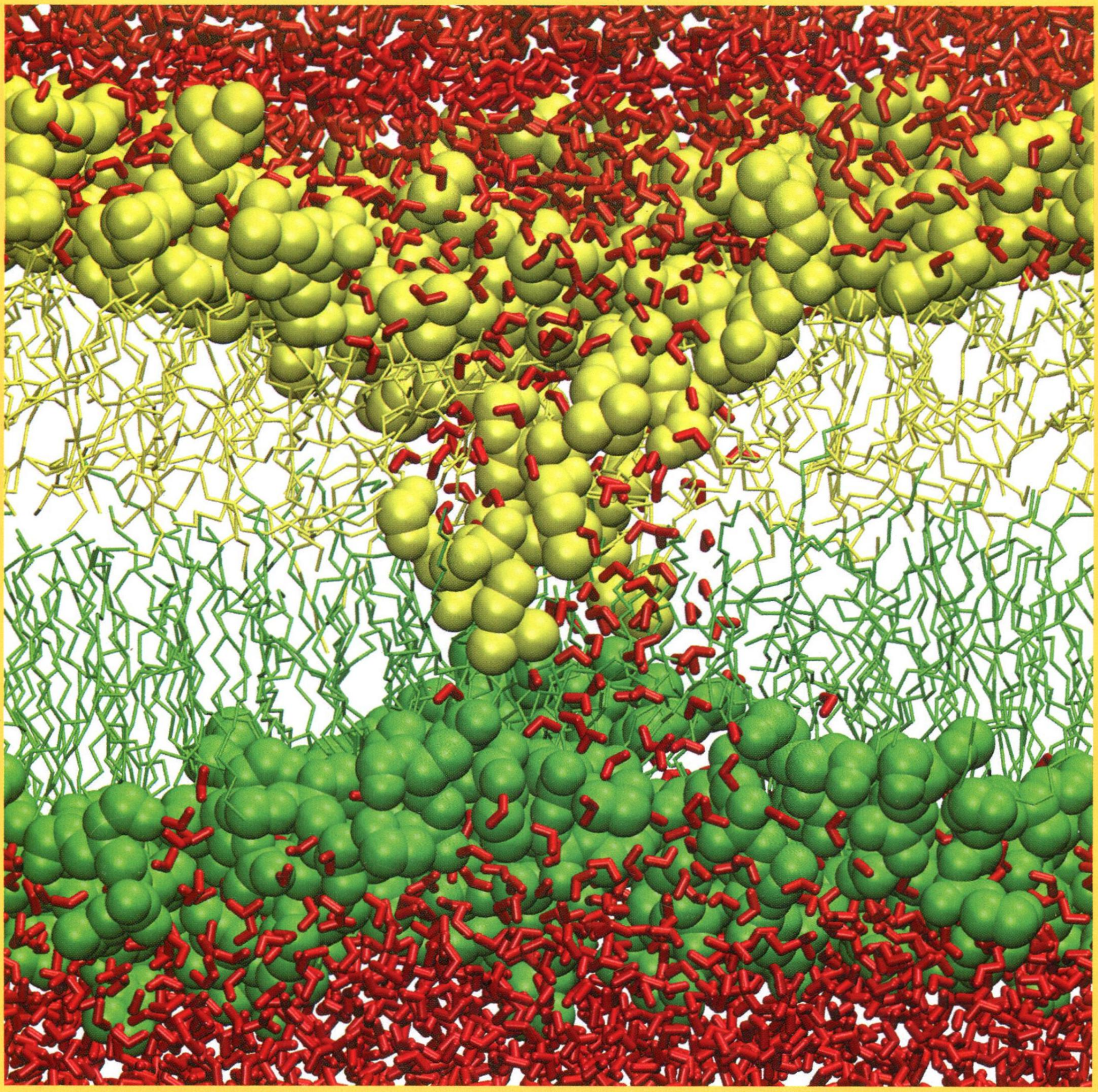

Electric Field-Induced Pore Formation in an Asymmetric Model Membrane Comprised of Phosphatidylcholine (Yellow) and Phosphatidyl-ethanolamine (Green) Lipid Monolayers (see page 9909)

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ON THE COVER: Electric field-induced pore formation in an asymmetric model membrane comprised of phosphatidylcholine (yellow) and phosphatidylethanolamine (green) lipid monolayers. Electroporation phenomena in asymmetric phospholipid membranes. Atomic-scale molecular dynamics simulations reveal the molecular mechanism of electric field-induced pore formation in asymmetric membranes comprised of phosphatidylcholine (PC) and phosphatidylethanolamine (PE) lipid monolayers. Such model membranes account for the transmembrane lipid asymmetry that is an inherent feature of plasma membranes of animal cells: PC and PE lipid monolayers mimic the outer and inner leaflets of plasma membranes, respectively. The cover displays an early stage of pore formation in an asymmetric PC/PE membrane as induced by an external electric field. In contrast to single-component phospholipid membranes, the formation of a pore turns out to be asymmetric and occurs mainly on the PC side. In particular, water molecules penetrate in the membrane interior mostly from the PC side and the reorientation of lipid head groups also takes place in the PC leaflet. In turn, the PE leaflet is considerably more robust against an electric field due to inter-lipid hydrogen bonding, so that the PE lipid head groups do not enter the central region of the membrane till the water pore becomes rather large and is partly stabilized by PC head groups. Overall, the findings provide compelling evidence that the transmembrane lipid asymmetry can be essential for understanding electroporation phenomena in living cells. PC and PE lipids are shown in yellow and green, respectively; water molecules are shown in red. See page 9909.

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